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Are self-regulation and self-control mediators between psychological basic needs and intrinsic teacher motivation?¹

Abstract

The focus of this paper is the investigation of personal and environmental conditions of intrinsic teacher motivation. Teacher motivation and particularly underlying conditions for intrinsic teacher motivation still constitute a peripheral issue in educational and psychological research. The question whether relatively stable personality dispositions predict intrinsic teacher motivation has been largely neglected, too. Following self-determination theory (SDT; Deci & Ryan, 1985b; Ryan & Deci, 2002) and Kuhl's Personality-Systems-Interaction Theory (PSI Theory; Kuhl, 2001), we investigate whether perceived support of basic psychological needs (autonomy, competence, and social relatedness), as well as the personality aspects self-regulation (self maintenance) and self-control (goal maintenance) are related to intrinsic teacher motivation. The sample of the survey study consists of 136 Austrian secondary school teachers. Structural equation modeling supports a model in which self-regulation serves as a mediator between the perceived support of basic needs and intrinsic teacher motivation, whereas self-control does not play a significant role for the prediction of intrinsic teacher motivation.

Keywords

Intrinsic teacher motivation; Self-determination theory (SDT); Basic psychological needs; Self-regulation; Self-control; Personality-Systems-Interaction Theory (PSI)

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Sind Selbstregulation und Selbstkontrolle Mediatoren zwischen den psychologischen Basic Needs und intrinsischer Lehrermotivation?

Zusammenfassung

Der Artikel befasst sich mit personen- und umweltbezogenen Bedingungen der intrinsischen Lehrermotivation. Das Thema Lehrermotivation und insbesondere die Analyse ihrer Bedingungen waren bisher kaum Gegenstand der empirischen Forschung. Vor allem die Frage, inwiefern auch relativ stabile Persönlichkeitsdispositionen die intrinsische Lehrermotivation vorhersagen können, ist wenig erforscht. Auf der Basis der Selbstbestimmungstheorie (SDT; Deci & Ryan, 1985b; Ryan & Deci, 2002) und der Persönlichkeits-System-Interaktionstheorie (PSI Theorie; Kuhl, 2001) wird untersucht, inwiefern die Unterstützung der grundlegenden psychologischen Bedürfnisse nach Autonomie, Kompetenz und sozialer Einbindung sowie die der PSI Theorie zugrundeliegenden Persönlichkeitsaspekte Selbstregulation (Aufrechterhaltung des Selbst) und Selbstkontrolle (Aufrechterhaltung von Zielen) die intrinsische Motivation von Lehrpersonen vorhersagen können. Es wurden 136 Lehrpersonen der Sekundarstufe II mittels Fragebogen befragt. Analysen auf Basis von Strukturgleichungsmodellen zeigen, dass die Selbstregulation als Mediator zwischen der wahrgenommenen Basic Needs-Unterstützung und der intrinsischen Motivation fungiert. Im Gegensatz dazu erwies sich Selbstkontrolle als ungeeigneter Prädiktor für die intrinsische Motivation von Lehrerinnen und Lehrern.

Schlagworte

Intrinsische Lehrermotivation; Selbstbestimmungstheorie; Grundlegende psychologische Bedürfnisse; Selbstregulation; Selbstkontrolle; Theorie der Persönlichkeits-System-Interaktion (PSI)

1. Introduction

Intrinsic motivation remains an important construct in educational and psychological research, reflecting the natural human propensity to learn and assimilate. In the last two decades conditions, processes, and outcomes of students' intrinsic learning motivation have often been the topic of empirical research (e.g. Reeve, 2002; Reeve, Deci, & Ryan, 2004). In contrast, teacher motivation and particularly conditions and effects of teacher motivation² are not yet satisfyingly investigated issues in educational and psychological research.

This lack of research regarding intrinsic motivation for teaching is surprising, especially when compared to the comprehensive research regarding teachers' orientation for creating autonomous learning environments in order to foster students' intrinsic motivation (Assor, Kaplan, & Roth, 2002; Reeve, 2002; Vallerand, Fortier, & Guay, 1997). Empirical studies in different work settings have demonstrated im-

2 In this paper, intrinsic teacher motivation means the intrinsic motivation of teachers for teaching in the classroom.

pressively that intrinsic motivation and other autonomous types of motivation are correlated with various positive cognitive and affective outcomes. Previous research also pointed out the environmental aspects that are primarily effecting intrinsic motivation at the workplace (e.g. Deci, et al., 2001; Harteis, Bauer, Festner, & Gruber, 2006; Keddi, 2008). In addition, there are a few studies that have dealt with the interrelation between work conditions and (intrinsic) teacher motivation (Butler, 2007; Leroy, Bressoux, Sarrazin, & Trouilloud, 2007; Müller, Hanfstingl, & Andreitz, 2009; Pelletier, Legault, & Séguin-Lévesque, 2002; Schellenbach-Zell & Gräsel, 2010; Taylor, Ntoumanis, & Standage, 2008; see also the editorial of this special issue).

Most of these studies put their focus only on environmental aspects of teacher motivation (or on outcomes of teacher motivation). But environmental variables, however, can only explain a moderate part of the variance of intrinsic motivation. The question whether relatively stable personality dispositions predict intrinsic teacher motivation has been largely neglected. Yet, it is also possible that personal traits of a teacher such as attitudes, orientations, and aspects of self-regulation or other self-referring cognitions could have a direct or indirect effect on teacher motivation. Depending on one's personality some teachers are possibly able to maintain his/her intrinsic motivation for teaching, in despite of restrictive conditions at work. For another teacher the same environment could undermine his or her intrinsic motivation. In general terms our approach states that relevant personality traits significantly influence the person-environment interaction. Following this approach our study investigates whether environmental and personality variables could predict teacher motivation.

As theoretical basis we used Self-Determination Theory (SDT; e.g. Ryan & Deci, 2002) and Personality-Systems-Interaction Theory (PSI Theory; Kuhl, 2001, 2006). Our research questioned whether the known correlations between perceived environment and intrinsic motivation have been overrated as they do not take into account aspects of the personality. This study investigates how environmental and personality aspects are interlinked and how they can predict intrinsic motivation for teaching.

In the following section we will present the theoretical background of our research, namely the Self-Determination Theory (Ryan & Deci, 2002) followed by those parts of the Personality-Systems-Interaction Theory (Kuhl, 2001) which are relevant for our study. Then the research design, the research questions and the results will be presented. Theoretical and practical implications as well as desiderata for further research will be discussed in the last section of this paper.

2. Theoretical background

*Intrinsic motivation and Self-determination Theory*³

Why is intrinsic teacher motivation an important topic for educational and psychological theory and practice? The following definition of intrinsic motivation displays its possible relevance for the teaching profession:

Perhaps no single phenomenon reflects the positive potential of human nature as much as intrinsic motivation, the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn. (Ryan & Deci, 2000, p. 70)

It can be assumed that the factors mentioned in this definition are essential not only to learn but also to teach successfully. Sylvia and Hutchinson (1985) underline this argumentation: '[intrinsic] teacher motivation is based in the freedom to try new ideas, achievement of appropriate responsibility levels, and intrinsic work elements' (p. 855). However, teachers suffer more than other professional groups from a lack of motivation (e.g. de Jesus & Lens, 2005) and high levels of stress (for an overview see Rothland, 2007; Schaarschmidt, 2010).⁴ Given the fact that previous research found positive correlations between intrinsic teacher motivation and job satisfaction (e.g. Bishay, 1996; Dinham & Scott, 1996) more attention should be paid to the issue of teacher motivation and particularly intrinsic teacher motivation. There is also empirical evidence that teachers' intrinsic motivation and enthusiasm are significantly linked to the feelings of personal accomplishment, to the quality of learning environment and to students' learning (e.g. Kunter, et al., 2008; Roth, Assor, Kanat-Mayom, & Kaplan, 2007). Additionally, Müller et al. (2009) demonstrated that there is an association between intrinsic motivation for teaching, teachers' beliefs about the learners' intrinsic motivation and students' satisfaction of autonomy, competence and relatedness. In sum, intrinsic teacher motivation showed to have a positive impact on classroom behavior, well being, job satisfaction, and students' learning.

SDT is a macro theory of human motivation, personality, development and well being. Because of the integration of five different sub-theories which explain the genesis of intrinsic motivation and the understanding of intrinsically motivated processes, SDT is a very powerful approach (e.g. Deci & Ryan, 1987). The sub-theories of the SDT are the Cognitive Evaluation Theory (CET; Deci & Ryan, 1980), the Organismic Integration Theory (OIT; Deci & Ryan, 1991; Ryan & Deci, 2002), the Basic Needs Theory (BNT; Deci & Ryan, 1985b; Ryan & Deci, 2002), the Causality Orientation Theory (COT; Deci & Ryan, 1985a), and the Goal Content Theory (GCT; Vansteenkiste, Lens, & Deci, 2006).

3 One further article in this volume uses SDT to investigate teacher motivation. Hence we abandoned a very detailed description of the theory: see the paper of Schellenbach-Zell and Gräsel in this issue.

4 However, the research results about teachers' stress are partly inconsistent (for a summary see Rothland, 2007).

In our study we mainly refer to the Basic Needs Theory. The Basic Needs Theory (BNT) postulates that three universal basic psychological needs for competence, autonomy and social relatedness are essential to ensure psychological health and well-being; especially the needs for autonomy and competence have to be satisfied to develop and maintain intrinsic motivation. People have the need to experience the self as capable of acting successfully in different situations (the need for competence) as well as the need to feel autonomous in acting (the need for autonomy). Furthermore, individuals have the need for being connected in the social system they are involved in (the need for social relatedness). Basic psychological needs can be understood as a sub-aware and integrated system which allocates a permanent feedback about the quality and function of person-environment interactions (Krapp, 2005). This system is essentially relevant for securing an organism's development and for the optimal functioning of the human psyche. In other words, and this fact is important for our study, the satisfaction of the basic needs is fundamental for the maintenance and the development of intrinsic motivation. For our research we used the BNT to investigate whether teachers perceive support of the basic need for autonomy, competence and social relatedness at their school and whether need support can predict intrinsic motivation for teaching. As mentioned above, intrinsic motivation does not only depend on environmental variables (like the perception of need support), but also on the personality of individuals.

Personality-Systems-Interaction Theory (PSI Theory)

The Personality-Systems-Interaction theory (PSI theory) developed by Kuhl (2001; Kuhl & Fuhrmann, 2008) is a holistic personality approach which explains human functioning on the basis of inner processes of regulation. The core of the theory is based on the assumption that personality comprises two modes of volition: (1.) the 'self-control system' and (2.) the 'self-regulation system'. These two subsystems have different tasks toward the regulation of a person.

The function of the *self-control system* is on the one hand maintaining individuals' intended goals. It is directed towards the future and comprises the analyzing part of consciousness ('intention memory'). On the other hand, self-control has a second function that is responsible for the automatic processing of goal orientated activities. A typical activity requiring the self-control system is the plan to tidy up one's apartment managed by the intention memory. In doing so, we have access to processes that take place automatically; we do not need to plan each step of using the vacuum cleaner to clean all carpets of the apartment. Self-control is operationalized by scales such as planning and fear control (see section 4.2).

In contrast to this, the *self-regulation system* has the task to maintain the self of a person. On the one hand self-regulation is based on the so called 'extension memory'. The extension memory – also described as implicit memory – is responsible for the holistic feeling of the self and comprises memories and "cognitive maps" that represent a person's self-congruent contents. Furthermore, the extension memory contains parts of implicit semantic and episodic (autobiographical)

memory contents (Fröhlich & Kuhl, 2003). As opposed to this, the second macrosystem of self-regulation called the ‘automatic sensoric processing’ detects self-incongruent sensations. For example, if a member of a task group finds out that the group’s attitudes are not really compatible with his or her own attitudes: These self-incongruent contents activate the automatic sensoric processing whereas the extension memory deals with self-congruent contents. Scales measuring self-regulation are self-calming, self-motivation and self-determination (see section 4.2).

To sum up, self-control is linked to the maintenance of goals, analyzing of facts, and the conducting of plans, whereas self-regulation comprises the maintenance of the self and the processing of self-congruent and self-incongruent topics. Although Ryan, Kuhl, and Deci (1997) conceive a functional connection between psychological basic needs, self-regulation system, the process of internalization, and intrinsic motivation, empirical research about the relationship between the basic needs, self-control, self-regulation, and intrinsic motivation have barely been conducted yet.

3. Research questions and hypotheses

The main topic of the paper is to investigate the connection between the basic needs autonomy, competence, and social relatedness with self-control and self-regulation on the one hand, and intrinsic motivation on the other hand. We assume that the three constructs can be understood as environmental (basic needs), personal (self-control and self-regulation), and motivational (intrinsic motivation) factors which stand in a specific relation to each other: Environmental factors do influence intrinsic motivation, but their influence could be mediated by personal characteristics. In the following, we will point out our research questions more detailed:

Firstly, according to self-determination theory, we presume that perceived support of the basic needs is positively correlated with intrinsic motivation. Ryan and Deci (2000) point out that support and satisfaction of basic needs are essential to develop and maintain intrinsic motivation.

Secondly, in line with the PSI theory we assume that the modes ‘self-control’ and ‘self-regulation’ are general aspects of the personality which play an important role in motivational regulatory processes. More precisely, we expect the self-regulation system which is important for the holistic feeling to be a decisive predictor for intrinsic motivation. The reason for our presumption lies in the characteristic of intrinsic motivation: A person is intrinsically motivated if he or she does something because of the process of doing it is accompanied by feelings of self-congruence, in the sense of “the journey is the reward”, and not because of achieving a goal or some output. Furthermore, we suppose that the self-control system, which is necessary for goal maintenance, for planning, and explicit thinking, is associated with more extrinsic forms of motivation.

Thirdly we examine whether the association between basic needs and intrinsic teacher motivation is a direct one or if we can assume that self-control or self-regulation (as a person-internal factor) plays a mediating role between perceived support of basic needs and intrinsic teacher motivation. In line with the second hypothesis we proceed on the assumption that self-regulation will rather mediate the connection between basic needs and intrinsic motivation than self-control.

4. Method

4.1 Sample

The data of the following study derive from a nationwide survey focusing on, inter alia, student and teacher motivation including 136 classes (2580 students) and their teachers. The mean age of the participating teachers is 46.1 years ($Md = 47$; $SD = 9.2$); the youngest teacher was 27 years old, the oldest 62. 74 teachers (54.4 %) are female, 62 (45.6 %) are male. The teachers are employed in schools including all types of the Austrian secondary school system: 51 (37.5 %) in academic track schools, 29 (21.3 %) in lower track schools, 15 (11.0 %) in higher vocational schools and 7 (6.5%) in other school types. The teachers of the sample mostly teach mathematics, science and German language. The paper-pencil-questionnaires were sent and recollected via regular mail.

4.2 Measures

In the following, the variables are listed and a few item examples are introduced for better comprehensibility. All scales have satisfying values for inner consistency.

Most items of the basic needs scales were taken from the Basic Psychological Needs Scale (BPNS) from Deci and Ryan (2009). We adapted the scales for the school setting and translated them into the German language.

To examine intrinsic motivation for teaching a self-developed scale in German language was conducted. The scale was developed in line with the Academic Self-Regulation Questionnaire (SRQ-A; Ryan & Connell, 1989) and partially with the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989). The reliability for the German version of the teacher motivation scale has been tested in several studies (Müller et al., 2009).

For the basic needs scale and the intrinsic motivation scale we used a 5-point Likert scale from 'true at all' to 'not true at all':

Perception of the support of basic needs at school

1. Support of autonomy (7 items, $\alpha = .83$)
 - 'In our school I can do my job as I like'
2. Support of competence (8 items, $\alpha = .75$)
 - 'Our school supports me to develop my competences'
3. Social relatedness (9 items, $\alpha = .91$)
 - 'I have got a good rapport to my colleagues'

Intrinsic motivation for teaching (5 items, $\alpha = .89$)

- '... because I feel personal gain collaborating with young people.'
- '... because it is really exciting for me working as a teacher.'

To investigate the personality factors 'self-control' and 'self-regulation' teachers were asked to complete the German version of the Volitional Component Inventory (VCI; Kuhl & Fuhrmann, 2008). Because of copyright issues the items of the VCI cannot be published in this article. The German version described by Fröhlich and Kuhl (2003) contains two scales measuring self-control: (1.) *planning* measures cognitive self-control and (2.) *fear-control* belongs to affective self-control. Planning ($\alpha = .85$) means the ability to plan activities in the future and the ability to imagine a chain of actions. Fear-control ($\alpha = .76$) describes the capability to motivate oneself without feeling under pressure that bad things could happen if the planned activities were not completed. The second scale measuring self-regulation comprises the subscales *self-determination*, *positive self-motivation*, and *self-calming*. Self-determination ($\alpha = .79$) within VCI is defined as doing things with free will, being aware that doing actions are really wanted by oneself. Positive self-motivation ($\alpha = .76$) can be understood as the ability to foster the own stamina or to concentrate on positive aspects in doing difficult challenges. Self-calming ($\alpha = .84$) means the competence abolishing excitement to get capable for acting. For the VCI scales we used the original 4-point Likert-scale, the items are formulated in a very general meaning and do not take into account any contextual aspects.

4.3 Data analysis

Besides descriptive statistics we used structural equation modeling to test the interrelations between basic needs support at school, self-regulation and intrinsic motivation to teach. The statistical analysis was conducted with Amos 18 (Arbuckle, 2009).

Due to the small sample of $N = 136$ subjects we decided to take a loss on validity and to parcel items into scales for reducing complexity of the models. For parameter estimation we used general least squares (GLS). Boomsma and Hoogland (e.g. 2001) describe GLS as a conservative estimator that tends to underestimate

parameters if samples are smaller than $N < 200$ and is appropriate even for small sample size. Thus, for our analyses the GLS estimator seems to be a well working alternative. To test the mediating models we used the approach by Baron and Kenny (1986), a generally accepted procedure for testing mediating models that is described below.

5. Results

First, we show the correlations between the three psychological needs, self-control, self-regulation, and intrinsic motivation (Table 1). The three basic needs scales autonomy, competence, and social relatedness correlate significantly positively with the three self-regulation scales of the VCI (but there is a low correlation between basic needs and the self-control scale). Furthermore, the three basic needs correlate significantly positive with intrinsic motivation, but autonomy has the lowest correlation.

Table 1: Means and intercorrelations of the basic need scales, self-regulation and self-control scales, and intrinsic teacher motivation

Variables	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.
Basic Needs:										
1. Autonomy	4.06	.62								
2. Competence	3.80	.58	.64**							
3 Social relatedness	3.99	.67	.54**	.74**						
Self-regulation:										
4. Self-determination	3.06	.56	.50**	.59**	.33**					
5. Positive self-motivation	2.89	.53	.39**	.59**	.33**	.69**				
6. Self-calming	2.71	.64	.40**	.55**	.33**	.69**	.72**			
Self-control:										
7. Planning	3.10	.57	.07	.28**	.19*	.26**	.36**	.28**		
8. Fear-control	3.36	.62	.35**	.33**	.25**	.25**	.30**	.29**	.08	
Intrinsic teacher motivation	4.40	.54	.19*	.43**	.22**	.38**	.42**	.35**	.12	.08

N = 136.

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

When analyzing the relation between self-regulation, self-control, and intrinsic motivation there is one obvious effect: all three self-regulation scales correlate substantially positive with intrinsic motivation whereas the two sub-scales of self-control, namely planning and fear-control, do not correlate with intrinsic teacher motivation.

According to the aim of the study we tested if self-control or self-regulation can be seen as a mediator between the basic needs and intrinsic teacher motivation. For the examination of the mediating role of self-regulation and self-control, we

followed the method described by Baron and Kenny (1986): First of all, we investigated if the β -weight between the latent variable basic needs and intrinsic motivation is a significant one. This effect can be expected because of the bivariate correlations that were shown above (Table 1). In the model we included the latent variable basic needs and intrinsic motivation as a manifest variable. The significant regression weight between basic needs and intrinsic motivation is $\beta = .44^{**}$, the Goodness-of-Fit indices are acceptable with $\chi^2 = 5.60$; $df = 2$; $\chi^2/df = 2.79$; NFI = .92; GFI = .98; CFI = .94. In contrast to this, no significant connection between self-control and intrinsic motivation $\beta = .34$ (n. s.) was found. Thus, self-control cannot play – as theoretically expected and as shown in the correlations in Table 1 – a mediating role between basic needs and intrinsic motivation. Therefore only self-regulation will be tested as a mediator between the basic needs and intrinsic motivation. As can be seen in figure 1b, there also exists a significant regression between the latent variable self-regulation and intrinsic motivation ($\beta = .46^{**}$; $\chi^2 = 1.72$; $df = 2$; $\chi^2/df = .86$; NFI = .97; GFI = .99; CFI = 1.00).

Figure 1: Connections between basic needs and intrinsic motivation (Figure 1a) and self-regulation and intrinsic motivation (Figure 1b)

Figure 1a

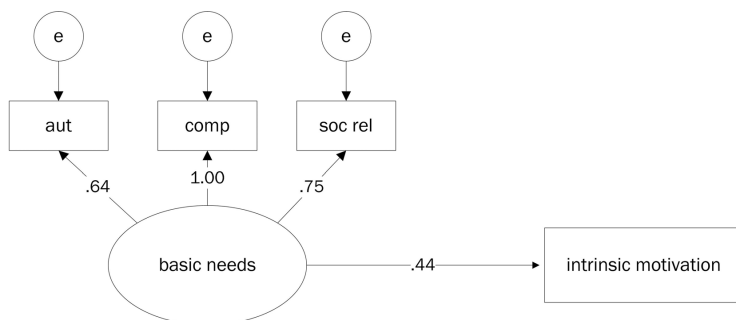
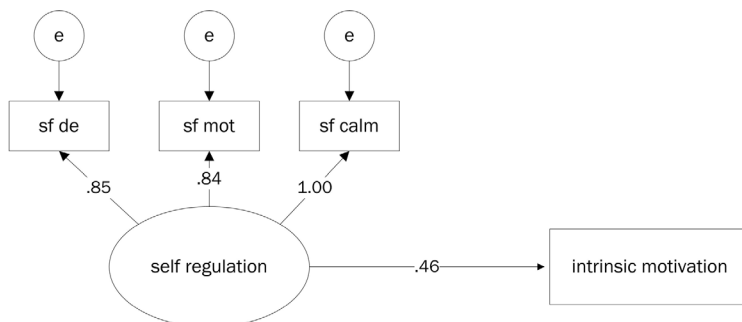


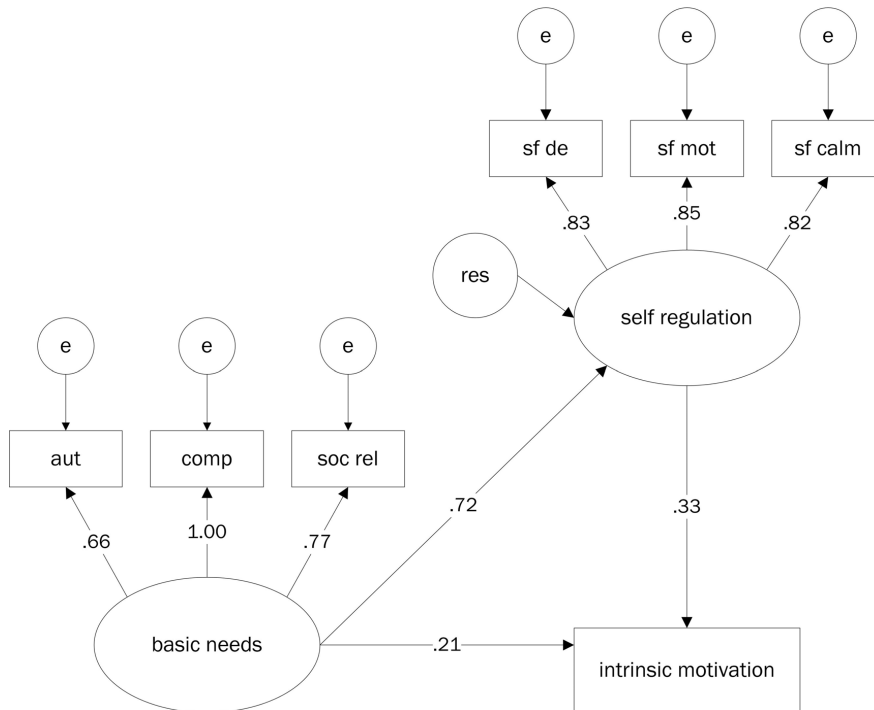
Figure 1b



Note. aut.: Autonomy (basic need); comp.: Competence (basic need); soc rel.: Social relatedness (basic need); sf de.: Self-determination (self-regulation); sf mot.: Positive self-motivation (self-regulation); sf calm.: Self-calming (self-regulation). $N = 136$.

In a next step we examined how the regression weights change if we arrange the latent variables basic needs, self-regulation, and intrinsic motivation. Figure 2 shows that the path between basic needs and intrinsic motivation declines from $\beta = .44^{**}$ (Figure 1a) to $\beta = .21$ (n. s.) in model 1, when self-regulation is modeled as a mediator between the basic needs and intrinsic motivation.

Figure 2: Model 1 showing the paths between basic needs, self-regulation, and intrinsic motivation without restrictions ($\chi^2 = 24.5$; $df = 12$, $\chi^2/df = 2.01$; NFI = .78; GFI = .95; CFI = .86)



Note. aut.: Autonomy (basic need); comp.: Competence (basic need); soc rel.: Social relatedness (basic need); sf de.: Self-determination (self-regulation); sf mot.: Positive self-motivation (self-regulation); sf calm.: Self-calming (self-regulation).

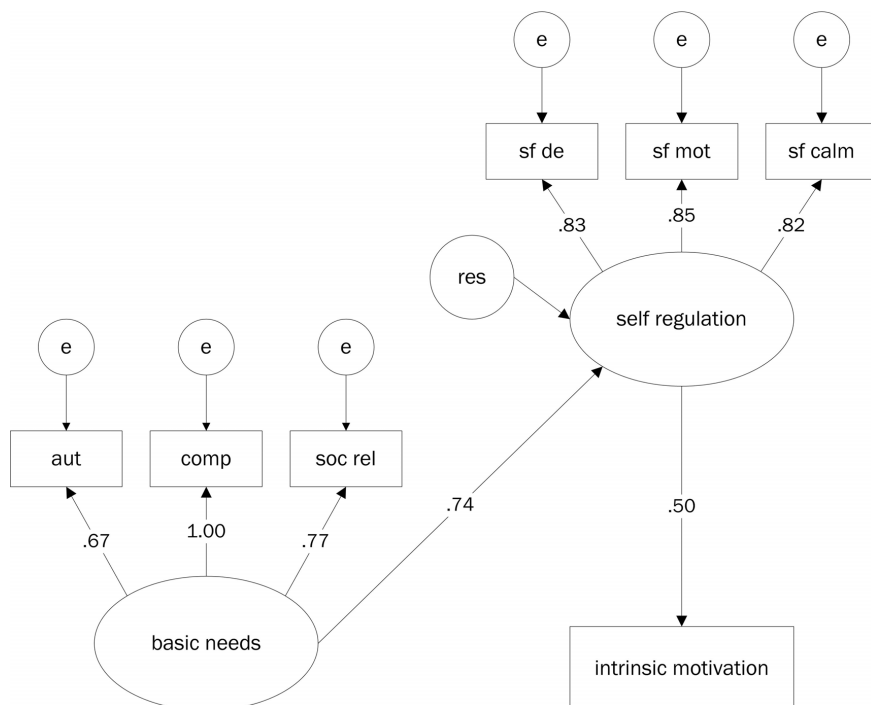
$N = 136$.

In this model the path between self-regulation and intrinsic motivation diminishes from $\beta = .46^{**}$ to $\beta = .33^*$, but stays significant at a moderate level. Additionally, the connection between basic needs and self-regulation is high with $\beta = .72^{**}$.

To summarize, when modeling self-regulation as a mediator between the basic needs and intrinsic motivation, the significant path between basic needs and intrinsic motivation disappears, whereas both, the path between basic needs and self-regulation and the path between self-regulation and intrinsic motivation, become significant.

If model 1 is modified to model 2 (see Figure 3) and the path between basic needs and intrinsic motivation is fixed at zero, the path between the basic needs and self-regulation changes only minimally from $\beta = .72^{**}$ to $\beta = .74^{**}$ and the path between self-regulation and intrinsic motivation increases from $\beta = .33^{**}$ to $\beta = .50^{**}$.

Figure 3: Model 2 showing the paths between basic needs, self-regulation, and intrinsic motivation with a zero path between basic needs and intrinsic motivation ($\chi^2 = 26.6$; $df = 11$, $\chi^2/df = 2.05$; NFI = .78; GFI = .95; CFI = .86)



Note. aut.: Autonomy (basic need); comp.: Competence (basic need); soc rel.: Social relatedness (basic need); sf de.: Self-determination (self-regulation); sf mot.: Positive self-motivation (self-regulation); sf calm.: Self-calming (self-regulation).
 N = 136.

In order to investigate if the mediation between the basic needs and intrinsic motivation is a complete one, we compare model 1 and model 2 via a chi-square difference test. Generally, the chi-square difference test is applied if one of two competing models has to be selected. Furthermore, if the chi-square difference test is significant it can be supposed that two models are based upon different assumptions and they are not comparable. In contrast to this, if the chi-square difference test is not significant, no difference between the two models can be assumed; they are equal and represent the same model. The test conducted with Amos shows a non-significant effect ($\chi^2 (1, 136) = 2.53$; $p = .11$; $\Delta\text{NFI} = .02$). Following this, model 1

and model 2 are of equal quality and the path between the basic needs and intrinsic motivation can be seen as a zero-path. To sum up, the influence of the support of basic needs for intrinsic teacher motivation here is completely mediated by self-regulation whereas self-control cannot be identified as a mediator. To underline this result, we tested if basic needs satisfaction can be seen as mediator between self-regulation and intrinsic motivation. Whereas the regression weights stay the same, the basic needs do not show the complete mediating effect between self-regulation and intrinsic motivation.

6. Summary and discussion

The aim of the study was to investigate the relevance of perceived psychological basic needs support (autonomy, competence, and social relatedness) as well as the two personality factors self-regulation (self maintenance) and self-control (goal maintenance) for intrinsic teacher motivation.

Having a look on the first hypothesis that basic needs correlate positively with intrinsic motivation, we could confirm previous findings regarding the correlation between the basic needs and intrinsic teacher motivation (Leroy et al., 2007; Müller et al., 2009; Pelletier et al., 2002; Schellenbach-Zell & Gräsel, 2010; Taylor et al., 2008).

Considering the second hypothesis we found, that the personality variable self-regulation can predict a considerable part of the variance of intrinsic teacher motivation ($\beta = .46^{**}$). This result relates to the underlying theoretical assumption, that self-regulatory processes – in terms of the PSI theory and the SDT – are constitutive for intrinsic motivation. In contrast to this, as we assumed, self-control does not correlate with intrinsic motivation. Consequently self-control was not tested as a mediator between the basic needs support and intrinsic teacher motivation.

According to our third hypothesis, we investigated whether self-regulation serves as a mediator between need support and intrinsic motivation. Following the procedure of Baron and Kenny (1986), the results of the structural equation model indicated that self-regulation is a complete mediator between perceived basic needs support and intrinsic teacher motivation, whereas the path between basic needs and intrinsic teacher motivation was not significant. There is evidence that the association between basic needs and intrinsic motivation is an indirect one. We are aware that these findings cannot be generalized on the basis of only one study and that this effect has to be validated by using large sample size. Nevertheless, the findings could explain the role of self-regulative processes for the relation between basic needs and intrinsic motivation more detailed as we could find in literature up to now. A possible consequence of our results could be that self-regulative competencies help to maintain intrinsic motivation, even when maladaptive environmental influences are perceived. We are not the first providing evidence for this effect, because this approach is in line with resiliency research where people under prob-

lematic circumstances behave and develop in a positive way nevertheless. Already Csikszentmihalyi (e.g. 1990) mentioned comparable personal characteristics to describe a so-called 'autotelic personality'. An autotelic personality, in general, has the ability to regulate his/her emotions for experiencing flow or intrinsic motivation (even when the objective environmental conditions are not ideal). The result of self-regulation's mediating role allows us to draw the conclusion that a fulfillment of the basic needs per se is not sufficient to predict intrinsic motivation if there is a lack of self-regulation in a person. This consideration could explain the high interpersonal differences between people (especially between teachers from the same school) having the same or similar workplace conditions. When examining intrinsic motivation, an interindividual view focusing on self-regulative processes can be profitable. Additionally, our research results demonstrate that from a theoretical and empirical perspective the connection of SDT and PSI theory can be fruitful. Both theories postulate conscious, un- and subconscious processes as fundamental and conceive a 'personal self' as the centre of interpersonal regulation (see Ryan, Kuhl, & Deci, 1997).

The quality of motivation, however, has to be seen as an interdependent function of the individual and the environment. For an individual the general feeling to be self-determined, the ability to regulate emotions and the ability for positive self motivation (self-regulation) can be seen as a fundamental personality trait for motivation processes. Linking PSI theory and SDT, the perception of needs support (environment) and the interindividual differences of self-regulation (personality) can be conceptualized as the basic requirements for the experience of autonomy and competence and hence for intrinsic motivation.

7. Limitations

Based on our results, the assessment of intrinsically motivational processes (not only concerning teacher motivation) should pursue the following approaches: Firstly, in future research it seems to be necessary to integrate further person-related variables relevant for motivation (in addition to basic needs). We especially need more information about the interaction of environmental facets, needs support, personality variables and motivational processes. Secondly, it has to be validated if the mediating role of self-regulation we found in this study is a general one. At present this effect could be typical for our sample comprising people working as teachers. This fact definitively limits the results of our study. Thirdly, further research has to light up in a more precise way which other aspects of personality can be supposed to be responsible for this mediating effect. In our study we scrutinized the roles of self-control and self-regulation for the correlation between basic needs and intrinsic teacher motivation. Maybe there are other facets of personality that mediate the connection basic needs and intrinsic motivation as well. Additionally, our study was conducted only by questionnaires, on the basis of

cross-sectional data and not with the help of longitudinal data. Further research has to clear up if mediating effects of self-regulation and other personality facets can be supported by multi-method approaches and longitudinal studies, respectively.

Finally, we assume that socio-political or socio-economic aspects influence the motivation in work settings and in education directly or indirectly (Dörnyei, 1994; Ferrari & Mahalingam, 1998; Guay & Vallerand, 1997; McInerney & Van Etten, 2001; Noels, 2001). It is therefore necessary to identify these conditions and to consider them in empirical designs when investigating intrinsic motivation. Overall, it is important to focus on various motivation-relevant issues in the design of future research concerning teachers' (intrinsic) motivation: on the person him/herself, on the school environment, on the general structural and administrative conditions of the institution, and on external social conditions.

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